BAYOU TECHE TMDL FOR FECAL COLIFORM

SUBSEGMENTS 060205, 060301, and 060401

US EPA Region 6

With cooperation from the
Louisiana Department of Environmental Quality
Office of Environmental Assessment
Environmental Technology Division

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EXECUTIVE SUMMARY

Section 303(d) of the Federal Clean Water Act requires states to identify waterbodies that are not meeting water quality standards and to develop total maximum daily pollutant loads for those waterbodies. A total maximum daily load (TMDL) is the amount of a pollutant that a waterbody can assimilate without exceeding the established water quality standard for that pollutant. Through a TMDL, pollutant loads can be distributed or allocated to point sources and nonpoint sources discharging to the waterbody. A TMDL has been developed for fecal coliform bacteria for Bayou Teche.

Bayou Teche flows from its headwaters in South Central Louisiana to Charenton Drainage Canal and Lower Bayou Teche. Bayou Teche subsegments 060205, 060301, and 060401 were listed on both the 1998 and the October 28, 1999 Court Ordered §303(d) Lists as not fully supporting the water quality standard for primary contact recreation (swimming) and were ranked as high priority for TMDL development. Bayou Teche subsegment 060205 was listed on the Court Ordered §303(d) list. Louisiana's water quality standard for protection of the primary contact recreation use reads as follows:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100mL. These primary contact recreation criteria shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply."

The standard for secondary contact recreation reads similarly:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 Ml, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 2,000/100 Ml."

Five years (January, 1995 – December 1999) of monthly LDEQ monitoring data on Bayou Teche (collected at Breaux Bridge and Adeline) were assessed to determine if the primary and secondary contact recreation uses were being maintained. Analysis of the data for the November – April season shows that the secondary contact recreation use is being maintained at both sites (see Appendix A). Analysis of the data for the May – October season shows that the primary contact recreation use is not protected at both stations (see Appendix A). Therefore, a TMDL will be developed to protect the May – October season.

For the purpose of calculating current loading on Bayou Teche the average fecal coliform concentration at Adeline (most downstream/critical site) for the May – October season was calculated using monthly LDEQ monitoring data. In Bayou Teche, the monthly fecal coliform counts for this season ranged from 30 cfu/100Ml to 16,000 cfu/100Ml over the 5-year period (January, 1995-Decembert, 1999).

For the purpose of TMDL development, the criteria of 200/100 ml for the May – October season was applied. A TMDL fecal coliform loading curve for this period (May 1 – October 31) has

been generated as Figure 1. This TMDL loading curve was developed using Equation 1, substituting the criteria, 200 cfu/100 ml, for FC concentrations and varying flows. The attempt here is to show that while a TMDL may be expressed as a single point it can also be thought of as a continuum of points representing the criterion value and various flow values. An 88% reduction in fecal coliform loading during the May – October season will be needed to protect the primary contact recreation use.

1. Introduction

Bayou Teche subsegments 060205, 060301, and 060401 are listed on both the 1998 and the October 28, 1999 Court Ordered §303(d) Lists as not fully supporting the water quality standard for primary contact recreation (swimming). Subsegments 060301 and 060401 were ranked as high priority (ranking of 1) on the 1998 List. Additional sampling in Bayou Teche during 1998 confirmed that the standard for primary contact recreation was not being met. A TMDL for fecal coliform bacteria was developed in accordance with the requirements of Section 303 of the federal Clean Water Act. The purpose of a TMDL is to determine the pollutant loading that a waterbody can assimilate without exceeding the water quality standard for that pollutant; the TMDL also establishes the load reduction that is necessary to meet the standard in a waterbody. The TMDL consists of the wasteload allocation (WLA), the load allocation (LA), and a margin of safety (MOS). The wasteload allocation is the load allocated to point sources of the pollutant of concern, and the load allocation is the load allocated to nonpoint sources. The margin of safety is a percentage of the TMDL that accounts for the uncertainty associated with the model assumptions, data inadequacies, and growth.

2. Study Area Description

2.1 Bayou Teche, Subsegments 060205, 060301, 060401

Bayou Teche flows through the Vermilion-Teche River Basin in South Central Louisiana. The Vermilion-Teche River Basin lies in the Western Gulf Coastal Plain ecoregion. The watershed is characterized as plains/prairie, and the land is generally flat with a very gradual slope toward the Gulf of Mexico. Bayou Teche lies along an alluvial ridge with elevations ranging from 10 feet above sea level near Franklin to 30 feet at Port Barre. The land slopes away from this ridge to the bottomlands and swamps that lie one to three miles away at elevations that are five to ten feet lower than the elevation near the bayou. (LDEQ, 1987) For this reason, local drainage and runoff generally flow away from Bayou Teche, and Bayou Teche functions as a conveyance channel. Water is pumped from the Atchafalaya River to Bayou Courtableau and into Bayou Teche. Water is also diverted from Bayou Teche to the Vermilion River via Bayou Fuselier and Ruth Canal. Although local land use does not have a large effect on the water quality of Bayou Teche, land use figures are provided herein for information purposes. The predominant land use along Bayou Teche is shown in Table 1. (LDEQ, 1993)

Average annual rainfall in the Vermilion-Teche River Basin is near 60 inches, and average annual temperature is 68^{o}F. The wet, warm climate of South Louisiana contributes to the elevated fecal coliform counts in the state's waterways. The heavy rainfall results in a large volume of runoff, and the warm to moderate temperatures are conducive to bacterial survival and reproduction.

Table 1. Land Use (acres) in Segments 0602, 0603, 0604: Bayou Teche

SEGMENT	AGRICULTURE	URBAN	WETLAND	FOREST
0602	676,490 (64.1%)	46,942 (4.5%)	73,230 (6.9%)	245,115 (23.2%)

0603	294 (55.8%)	186 (35.3%)	0	0
0604	6,497 (77.5%)	1,805 (21.5%)	74 (0.9%)	0

2.2 Water Quality Standards

The designated uses for Bayou Teche include both primary contact recreation and secondary contact recreation. Fecal coliform bacteria are the indicator used for the water quality criteria and for assessment of use support. Louisiana's water quality standard for protection of the primary contact recreation use reads as follows:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 200/100mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 400/100mL. These primary contact recreation criteria shall apply only during the defined recreational period of May 1 through October 31. During the non-recreational period of November 1 through April 30, the criteria for secondary contact recreation shall apply."

The standard for secondary contact recreation reads similarly:

> "Based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content shall not exceed a log mean of 1,000/100 mL, nor shall more than 10 percent of the total samples during any 30-day period or 25 percent of the total samples collected annually exceed 2,000/100 mL."

2.3 Identification of Sources

The sources identified in the *1998 Louisiana Water Quality Inventory* as affecting the water quality of Bayou Teche are major and minor municipal point sources, small package treatment plants, minor industrial point sources, agriculture, and natural sources (LDEQ, 1998). Agriculture in the watershed includes row crops, such as sugar cane, corn, sweet potatoes, and soybeans, and some ranching. Other sources of fecal coliform bacteria are wild and domesticated animals.

2.3.1 Point Sources

There are 30 permitted facilities discharging sanitary wastewater into Bayou Teche and its tributaries. The combined flow of all these discharges is 3,943,923 gallons per day (See Appendix B).

2.3.2 Nonpoint Sources

The predominant land uses along the Bayou Teche ridge are agriculture and urban, both of which can contribute to fecal coliform loads through runoff. However, as has been stated in Section 2.1, surface drainage flows away from Bayou Teche. Therefore, it is unclear if agricultural and urban runoff contributes to the fecal coliform load in Bayou Teche. There are also numerous rural residences along both banks of the bayou where domesticated animals may be found. These rural residences may also contribute to the fecal coliform load if they have septic tanks or septic fields for their wastewater treatment.

3. TMDL Load Calculations

3.1 Current Load Evaluation

Fecal coliform loads have been calculated using the instream bacterial counts and the flow of the stream. The following equation can be used to calculate fecal coliform loads.

Equation 1. C x 1000mL/ L x 1 L/0.264 gallons x Q in gallons/day = cfu/day

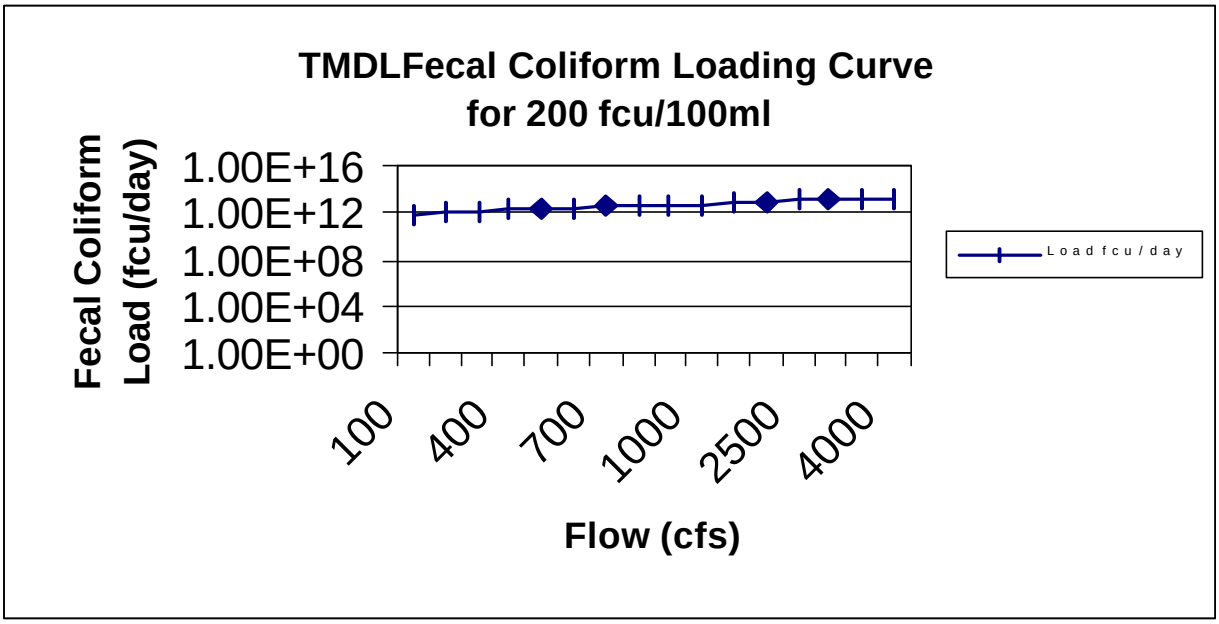
Where: C = colony forming units/100mL
Q = stream flow in gallons/day

A traditional expression of the FC loading may be developed by setting one critical or representative flow and concentration, and calculating the fecal coliform load using Equation 1. The difficulty with this approach is in the determination of the appropriate flow or concentration value to use. For the purpose of calculating current loading on the this waterbody the average fecal coliform concentration for the May-October season was calculated using monthly LDEQ monitoring data on Bayou Teche at Adeline, Louisiana. The Adeline site was used because water is diverted from Bayou Teche and the flow in the lower reach of Bayou Teche is approximately 70% of the flow measured at Arnaudville. The Adeline site is considered the most critical because of the lower flows. In Bayou Teche, the monthly fecal coliform counts for this season ranged from 30 cfu/100mL to 16,000 cfu/100mL over a 5-year period (January, 1995-Decembert, 1999). The average fecal coliform count for the May – October season at Adeline is 1675 cfu/100ml (see Appendix A). In addition, the average flow for Bayou Teche at Adeline, for the May – October season is 383 ft^3/sec (see Appendix C). Using these values and Equation 1 it is estimated that the current loading for the May – October season is 1.57E13 cfu/day.

3.2 TMDL

Point sources usually have a defined critical receiving stream low flow such as the 7Q10 at which the criterion must be met. For nonpoint sources it is recognized that there may be no single critical flow condition. To address this condition, a TMDL fecal coliform loading curve for the recreational period (May 1 – October 31) has been generated as Figure 1. This TMDL loading curve was developed using Equation 1, substituting the criteria, 200 cfu/100 ml, for FC concentrations and varying flows. The attempt here is to show that while a TMDL may be expressed as a single point it can also be thought of as a continuum of points representing the criterion value and various flow values. This curve is not stream dependent but is dependent upon the designated stream criterion. Therefore, it may be applied to any stream with a like FC criterion. This curve represents the TMDL loading allocation for FC.

Figure 1. TMDL Fecal Coliform Loading Curve for the May – October season.



Utilizing Figure 1 one can select a stream flow and can quickly determine the FC loading value. The line formed by this series of points may be thought of as a boundary. At any given flow the loading may be below the line, within the boundary, or above the line. FC load values falling above the line represent disproportionately high values relative to the standard. FC load values falling below the line represent low loads relative to the standard. To develop load reductions one simply needs to determine the appropriate flow value (x-axis) and see where it intersects the load allocation line.

The load reduction needed to meet the water quality standard for primary contact recreation in Bayou Teche at 383 cfs is 1.38 E13 cfu/day (88% reduction)[1]. This was obtained by calculating the allowable TMDL at 383 cfs for the 200 cfu/100ml criterion (1.87 E12 cfu/day) and subtracting this load from the observed load (1.57 E13 cfu/day, see Appendix A).

Current Load - TMDL = Load Reduction

1.57 E13 cfu/day – 1.87 E12 cfu/day = 1.38 E13 cfu/day

3.3 Wasteload Allocation (WLA)

The Louisiana Water Quality Regulations require permitted point source discharges of treated sanitary wastewater to maintain a fecal coliform count of 200 cfu/100 mL in their effluent, i.e., they must meet the standard at end-of-pipe. Therefore, there will be no change in the permit requirements based upon a wasteload allocation resulting from this TMDL.

[1] Expression of the load reduction percentage was adjusted since publication of the draft TMDL based on public comment; see EPA's response-to-comments at http://www.epa.gov/earth1r6/6wq/tmdl.htm for further explanation.

Equation 1 can be used to calculate the total point source load (wasteload allocation) utilizing a fecal coliform count of 200 cfu/100 mL and the total volume of all the wastewater dischargers (3,943,923 gallons/day).

200 cfu/100mL * 1000mL/L * 1 L/0.264 gallons * Q gallons/day = WLA

Where Q = Total volume of sanitary wastewater discharges into Vermilion River

WLA for all dischargers = 2.99 E10 cfu/day

3.4 Load Allocation (LA)

The load allocation for each season for a given flow can be calculated using Equation 1 and the following relationship:

(TMDL@ given flow and criterion) - (WLA)= LA

LA for May – October season at an instream flow of 383 cfs = 1.84 E12 cfu/day

1.87 E12 cfu/day (TMDL@ 383 cfs) – 2.99 E10 cfu/day (WLA) = 1.84 E12 cfu/day

3.5 Seasonal Variability

Louisiana has established a seasonal water quality standard for bacteria based upon definition of a summer swimming season and winter secondary contact only. In development of this TMDL data for all seasons were evaluated and it was determined that a TMDL for the May - October season was needed to protect the primary contact recreation use.

3.6 Margin of Safety (MOS)

The Clean Water Act requires that TMDLs take into consideration a margin of safety. EPA guidance allows for the use of implicit or explicit expressions of the margin of safety or both. When conservative assumptions are used in the development of the TMDL or conservative factors are used in the calculations, the margin of safety is implicit. When a percentage of the load is factored into the TMDL calculation as a margin of safety, the margin of safety is explicit. In this TMDL for fecal coliform, conservative assumptions have been used and therefore, the margin of safety is implicit. These conservative assumptions are:

- Using average seasonal flows to calculate current loading to obtain load reduction.
- Treating fecal coliform bacteria as a conservative pollutant, that is, a pollutant that does not degrade in the environment (bacteria do die off in the environment)
- Using the more conservative 200 cfu/100mL standard rather than 400 cfu/100mL for the summer primary contact recreational season and 1,000 cfu/100mL rather than 2,000 cfu/100mL for the winter season.

- Using the design flow of the point source dischargers rather than actual average flow rates, which are typically much lower
- Using the Adeline site, which is the most downstream site and also has lower instream flow due to diversions.

4. Other Relevant Information

Although not required by this TMDL, LDEQ utilizes funds under Section 106 of the federal Clean Water Act and under the authority of the Louisiana Environmental Quality Act to operate an established program for monitoring the quality of the state's surface waters. The LDEQ Surveillance Section collects surface water samples at various locations, utilizing appropriate sampling methods and procedures for ensuring the quality of the data collected. The objectives of the surface water monitoring program are to determine the quality of the state's surface waters, to develop a long-term data base for water quality trend analysis, and to monitor the effectiveness of pollution controls. The data obtained through the surface water monitoring program is used to develop the state's biennial 305(b) report (*Water Quality Inventory*) and the 303(d) list of impaired waters. This information is also utilized in establishing priorities for the LDEQ nonpoint source program.

The LDEQ has implemented a watershed approach to surface water quality monitoring. Through this approach, the entire state is sampled over a five-year cycle with two targeted basins sampled each year. Long-term trend monitoring sites at various locations on the larger rivers and Lake Pontchartrain are sampled throughout the five-year cycle. Sampling is conducted on a monthly basis or more frequently if necessary to yield at least 12 samples per site each year. Sampling sites are located where they are considered to be representative of the waterbody. Under the current monitoring schedule, targeted basins follow the TMDL priorities. In this manner, the first TMDLs will have been implemented by the time the first priority basins will be monitored again in the second five-year cycle. This will allow the LDEQ to determine whether there has been any improvement in water quality following establishment of the TMDLs. As the monitoring results are evaluated at the end of each year, waterbodies may be added to or removed from the 303(d) list. The sampling schedule for the first five-year cycle is shown below. The Vermilion-Teche River Basin will be sampled again in 2003.

1998 – Mermentau and Vermilion-Teche River Basins
1999 - Calcasieu and Ouachita River Basins
2000 – Barataria and Terrebonne Basins
2001 – Lake Pontchartrain Basin and Pearl River Basin
2002 – Red and Sabine River Basins

(Atchafalaya and Mississippi Rivers will be sampled continuously.)

In addition to ambient water quality sampling in the priority basins, the LDEQ has increased compliance monitoring in those basins, following the same schedule. Approximately 1,000 to 1,100 permitted facilities in the priority basins were targeted for inspections. The goal set by LDEQ was to inspect all of those facilities on the list and to sample 1/3 of the minors and 1/3 of

the majors. During 1998, 476 compliance evaluation inspections and 165 compliance sampling inspections were conducted throughout the Mermentau and Vermilion-Teche River Basins.

5. Public Participation

When EPA establishes a TMDL, 40 C.F.R. § 130.7(d)(2) requires EPA to publicly notice and seek comment concerning the TMDL. Pursuant to an October 1, 1999, Court Order, EPA prepared this TMDL. After submission of this TMDL to the Court, EPA commenced preparation of a notice seeking comments, information and data from the general and affected public. Comments and additional information were submitted during the public comment period and this Court Ordered TMDL was revised accordingly. EPA has transmitted this revised TMDL to the Court, and to the Louisiana Department of Environmental Quality (LDEQ) for incorporation into LDEQ's current water quality management plan.

REFERENCES

LDEQ, 1987. *State of Louisiana Water Quality ManagementPlan, Volume 4: Boundaries and Inventories*. Louisiana Department of Environmental Quality, Office of Water Resources, Baton Rouge, La.

LDEQ, 1993. *State of Louisiana Water Quality ManagementPlan, Volume 6, Part A: Nonpoint Source Pollution Assessment Report*. Louisiana Department of Environmental Quality, Office of Water Resources, Baton Rouge, La.

LDEQ, 1998. *State of Louisiana Water Quality ManagementPlan, Volume 5, Part B: Water Quality Inventory*. Louisiana Department of Environmental Quality, Office of Water Resources, Baton Rouge, La.

APPENDIX A Fecal Coliform data and loading calculations for each season.

Bayou Teche at Adeline, LA

November - April		FECAL COLIFORM		May - October		FECAL COLIFORM
DATE	TIME	MPN/100ML		DATE	TIME	MPN/100ML
------	----	---------		------	----	---------
12/07/1999	1120	300		10/12/1999	1115	3000
11/16/1999	1045	5000		09/14/1999	1100	500
01/12/1999	1220	900		08/10/1999	1030	1300
12/08/1998	1132	16000		07/13/1999	1215	3000
11/23/1998	1015	500		06/15/1999	1035	1300
11/09/1998	1229	300		05/11/1999	1330	16000
04/13/1998	942	130		10/27/1998	1115	2400
03/10/1998	1015	1300		10/13/1998	1145	9000
02/09/1998	926	500		09/22/1998	1115	2400
01/13/1998	1012	3000		09/08/1998	1035	30
12/08/1997	1009	800		08/25/1998	1040	300
11/17/1997	955	2400		08/11/1998	1115	80
04/14/1997	1010	1700		07/28/1998	1104	500
03/11/1997	1020	1700		07/14/1998	1015	50
02/18/1997	1025	1700		06/23/1998	945	500
01/06/1997	1026	1700		05/12/1998	955	300
12/09/1996	1015	170		10/13/1997	1005	130
11/19/1996	1035	300		09/09/1997	1013	50
04/08/1996	934	2400		08/11/1997	1030	800
03/12/1996	1005	300		07/15/1997	1025	800
02/12/1996	1040	300		06/09/1997	950	3000
01/09/1996	1010	300		05/13/1997	1038	230
12/12/1995	845	500		10/14/1996	1015	220
11/14/1995	910	2400		09/10/1996	1020	300
04/03/1995	830	500		08/12/1996	1005	5000
03/13/1995	910	1600		07/08/1996	1015	70
02/13/1995	900	1100		06/10/1996	955	50
01/09/1995	920	1600		05/14/1996	1005	500
	Average =	1764		10/10/1995	930	500
% Exceedance of 2000/100ml =		21%		09/11/1995	920	110

				08/14/1995	835	220
				07/10/1995	935	1700
				06/12/1995	805	1700
				05/08/1995	855	900
					Average =	1675
				% Exceedance of 400/100ml =		59%
		Flow	Fecal	Flow	Load	
		cfs	Count (fcu)	gal/day	fcu/day	
Current May - Oct Load		383	1675	247096774	1.57E+13	
Allowable May - Oct Load		383	200	247096774	1.87E+12	
% Load Reduction May - Oct		738				

Bayou Teche at Breaux Bridge

November - April		FECAL		May - October		FECAL
		COLIFORM				COLIFORM
DATE	TIME	MPN/100ML		DATE	TIME	MPN/100ML
------	----	---------		------	----	---------
12/02/1998	1200	300		10/21/1998	1132	300
11/18/1998	1122	500		10/07/1998	1232	5000
11/05/1998	1215	170		09/16/1998	1113	130
03/09/1998	850	800		09/02/1998	1143	220
01/12/1998	1040	3000		08/19/1998	1025	800
11/17/1997	1040	300		08/05/1998	1015	700
03/10/1997	1025	220		07/22/1998	1020	1100
01/06/1997	1100	1700		07/08/1998	1015	500
11/19/1996	915	50		06/17/1998	1000	700
11/18/1996	1125	1300		05/11/1998	1115	1700
03/11/1996	1238	300		09/08/1997	1045	300
01/08/1996	1110	1100		07/14/1997	1100	16000
11/14/1995	1100	300		05/12/1997	1120	130
03/14/1995	1130	5000		09/09/1996	1030	230
01/10/1995	1140	1100		07/08/1996	1045	170
	Average =	1076		05/13/1996	1000	300
% Exceedance of 2000/100ml =		13%		09/11/1995	1035	220
				07/10/1995	1150	700
				05/08/1995	1025	210
					Average =	1548
				% Exceedance of 400/100ml =		47%
		Flow	Fecal	Flow	Load	
		cfs	Count (fcu)	gal/day	fcu/day	
Current May - Oct Load		578	1548	372903226	2.19E+13	
Allowable May - Oct Load		600	200	387096774	2.93E+12	
% Load Reduction May - Oct		646				

APPENDIX B Dischargers in subsegment.

NOTE: For copies of Appendix B please contact Ellen Caldwell, EPA Region 6, 1445 Ross Avenue, Dallas, Texas 75202 or call (214) 665-7513.

APPENDIX C Flow calculation methodology.

January 27, 2000

DETERMINATIONS OF AVERAGE STREAMFLOW FOR SELECTED LADEQ WATER QUALITY STATIONS IN LOUISIANA.

Note: *The* "average streamflow" is defined to be the annual average streamflow.

Bayou Des Cannes northeast of Jennings (DEQ # 0308 and 0647) - Based on the runoff for the USGS station on Bayou Des Cannes near Eunice, 2.11 CFS per square mile, and a drainage area for the 308 site of 368.69 square miles, the average streamflow is estimated to be 778 CFS. . The May - October average flow is estimated to be about 73% of the annual average flow; the November - April average flow is estimated to be about 127 % of the annual average flow.

Bayou Nezpique at La. 104 north of Basile (DEQ 005) -- Based on the runoff for the USGS station on Bayou Nezpique near Basile, 1.89 CFS per square mile, and a drainage area for the 005 site of 327.62 square miles, the average streamflow is estimated to be 619 CFS. . The May - October average flow is estimated to be about 47% of the annual average flow**;** the November - April average flow is estimated to be about 153 % of the annual average flow.

Bayou Nezpique at La. 97 near Jennings (DEQ 309) -- Based on the runoff for the USGS station on Bayou Nezpique near Basile, 1.89 CPS per square mile, and a drainage area for the 309 site of 580 square miles, the average streamflow is estimated to be 1,096 CFS. The May - October average flow is estimated to be about 47**%** of the annual average flow-, the November - April average flow is estimated to be about 153 % of the annual average flow.

Bayou Nezpique at boat landing near Jennings (DEQ 651) - Based on the runoff for the USGS station on Bayou Nezpique near Basile, 1.89 CFS per square mile, and a drainage area for the 651 site of 585 square miles, the average streamflow is estimated to be 1, 106 CFS. The May - October average flow is estimated to be about 47**%** of the annual average flow; the November - April average flow is estimated to be about 153 % of the annual average flow.

Bayou Plaquemine Brule at Refinery (DEQ 650) - Based on the runoff for the USGS station on Bayou Des Cannes near Eunice (best available estimator), 2.11 CFS per square mile, and a drainage area for the 650 site of 331.87 square miles, the average streamflow is estimated to be 700 CFS. The May - October average flow is estimated to be about 73% of the annual average flow; the November - April average flow is estimated to be about 127 % of the annual average flow.

DETERMINATIONS OF AVERAGE STREAMFLOW FOR SELECTED LADEQ WATER QUALITY STATIONS IN LOUISIANA PAGE 2.

Bayou Boeuf at mouth (DEQ 668) - Based an the runoff for the USGS station an Bayou Courtableau near Washington, 1.56 CPS per square mile, and a drainage area for the 668 site of 234.33 square miles, the average streamflow is estimated to be 312 CFS. The May - October average flow is estimated to be about 53% of the annual average flow; the November - April average flow is estimated to be about 147% of the annual average flow.

Bayou Teche at Breaux Bridge (DEQ 03 1) -- Based on the adjusted runoff for the USGS station on Bayou Teche at Arnaudville and a subtraction of the estimated average flow for Bayou Fusilier, the estimated average streamflow is 760 CFS. The May - October average flow is estimated to be about 76% of the annual average flow; the November - April average flow is estimated to be about 124 % of the annual average flow.

Bayou Teche at Adeline (DEQ 030) – With the assumption that the average streamflow for the USGS station on Bayou Teche at Keystone Lock and Dam is the same as the average streamflow at Adeline, the estimated average streamflow for Site DEQ 030 is 491 CFS. The May-October average flow is estimated to be about 78% of the annual average flow; the November-April average flow is estimated to be about 122% of the annual average flow.

Vermilion River at Perry (DEQ 001) – Based on DEQ determinations for Vermilion River at Surrey Street in Lafayette using USGS data for the period 94-97, the average flow for the Vermilion River at Perry is about 750 CFS. For May-October, the average flow is estimated to be about 600 CFS; for November- April, the average flow is estimated to be about 900 CFS.